

district. In Alabama, eastern and northern Mississippi, and northern Louisiana the frosts were heavy and killing; in southwestern Mississippi and southern Louisiana light frost was reported. At Mobile the minimum temperature was 40°, and at New Orleans 46°, the lowest previous record for the third decade of October being 34°, at Mobile, and 42° at New Orleans. November 18 is the earliest date on which freezing temperature has ever occurred at New Orleans, and November 2 is the earliest date of freezing temperature at Mobile.

In central Mississippi and northern Louisiana, and also in northern Alabama and northern Georgia freezing weather has occurred in the third decade of October. The earliest date of heavy frost at Mobile was November 2, 1874-1878. The earliest date of heavy frost at New Orleans was November 11, 1877.

The first heavy frost has occurred as late as December 29 at Mobile, while at New Orleans November and December have in a number of years failed to show the occurrence of heavy frost. The average date of first heavy frost is November 22 at Mobile and December 7 at New Orleans.

The average minimum temperatures for the region referred to range from 50° to 55° during November, with occasional periods of freezing temperature.

The occurrence of light frost Tuesday morning, supplemented by heavier frosts and lower temperature this morning, may be considered unfavorable for the further progress of the disease. Present conditions indicate frost, and temperature 40°, or slightly below, to-night in Alabama, Mississippi, and in the interior of Louisiana. The temperature will probably remain for several days below the seasonal average, which is 66° at New Orleans and 65° at Mobile.

Acting upon the information contained in this bulletin, Edmond Souchon, President of the Louisiana Board of Health, issued the following proclamation, October 22, 1898:

Whereas, the Weather Bureau reports frosts occurring all over the State, and, whereas, it is a fact accepted by epidemiologists that no foci of yellow fever can be established in any place after frost is shown; therefore, be it ordained that all quarantine restrictions on traffic are hereby removed by the Louisiana State Board of Health, as far as it is concerned.

#### THE CHICAGO FORECAST DISTRICT.

Two storms of marked intensity caused dangerous gales over the upper lakes during the month. The first developed in the middle Mississippi Valley on the night of the 16-17th and remained nearly stationary for forty-eight hours. During the 17th and 18th the following maximum wind velocities occurred: Chicago, 63 southeast; Milwaukee, 40 south; Alpena, 38 southeast; Sault Ste. Marie, 38 southeast.

Storm signals were hoisted at all upper-lake ports at 9:30 a. m., October 17, giving ample warning of the gale.

The second storm was centered over northern Illinois the morning of the 25th, and it moved northeastward over lower Michigan during the succeeding twenty-four hours. The storm was attended by northerly gales, resulting in considerable damage to shipping on Lake Michigan and destroying much property along the shore in Chicago. The following maximum wind velocities occurred: Chicago, 48 north; Milwaukee, 40 north; Green Bay, 36 north; Marquette, 30 north. The wind forecast for the upper Lakes on the morning of the 24th was as follows:

Lake Superior, brisk and possibly high northerly winds; lakes Michigan and Huron, brisk and possibly high southerly winds, shifting on Michigan to northerly this afternoon or to-night and on Huron Tuesday morning.

Moreover, vessel masters leaving the port of Chicago during the afternoon and evening of the 24th were cautioned that strong northerly winds would be encountered farther down the lake. Some remained in port, while others proceeded on their way, intending to seek shelter in some harbor on the west shore as soon as the storm should strike. Storm signals were ordered up at all ports on the 25th, at 10:30 a. m., except Duluth, Chicago, and Grand Haven sections, the two latter being ordered at 3:30 p. m. The force of the storm was really centered over Lake Michigan, and the forecast for that lake, issued the morning of the 25th, was as follows:

Winds shifting to brisk and high northerly, probably becoming dangerous; rain to-night, possibly turning to snow flurries.

Although the maximum wind velocity from the southeast at Chicago on the 17th exceeded that from the north on the 25th by 15 miles per hour, there was no appreciable damage to shipping or property at the southern end of Lake Michigan during the former storm, yet on the 25th the tremendous sea, caused by the northerly on shore gale, wrought great havoc. It is also interesting to note that both these storms developed from long drawn out troughs of low pressure, which were apparently without distinct centers twelve hours previous to their development.—*H. J. Cox, Forecast Official.*

The following report of the storm of October 25 and 26 was made from Milwaukee on October 31, to the Secretary of Agriculture by the Chief of the Weather Bureau:

This storm stranded one vessel on the beach at Chicago, one at Milwaukee, another at Michigan City, Ind., and totally destroyed the steamer *Doty* off Racine, her crew of seventeen being lost. The Weather Bureau completely warned mariners of the coming of the storm by means of numerous messages distributed among the docks of all lake ports and by flag signals during the day and lanterns at night. I was in Chicago on Monday and personally supervised the action of Mr. Cox, who ordered the signals displayed. I make this statement because a rumor was started that the Bureau had failed to give warning of the storm. This rumor was quickly corrected by the press. I inclose a clipping from the Chicago Chronicle, and have marked a quotation from the statement of the cook on the consort of the *Doty*. This woman states that their vessel left Chicago harbor in tow of the *Doty* at a time when storm signals were flying.

I know of several vessel owners in Milwaukee who, in public, have congratulated themselves on the fact that they took heed of the warnings and ordered their craft held in port. It is probable that many scores of lives would have been lost, instead of seventeen, had not danger signals been displayed.

In this connection I desire to emphasize the fact that it is possible for a storm to strike the lake region without the Weather Bureau being able to give warning of the same, although such a condition has not occurred for a long time. Several times during my service of twenty years in the Weather Bureau I have seen storms develop in Iowa just after the regular observations were taken, and reach a few of the lake ports before warnings could be distributed. Happily such occurrences are rare.

#### SAN FRANCISCO FORECAST DISTRICT.

Rain warnings were distributed throughout the raisin drying district of California on the 1st, 7th, 21st, 22d, 29th and 31st, and to the fruit growing district north of Santa Cruz and Stockton on the 14th. All these warnings were fully verified. Although on one instance no rain fell at Fresno, showers prevailed throughout the greater portion of the San Joaquin Valley. There was no instance during this raisin drying season when rain occurred without warning, and no warning was issued without being fully verified. Probably 90 per cent of the crop was protected on account of the warnings, and the injury this year was very small indeed. The value of the crop probably amounts to \$2,500,000, which would possibly have been reduced one-half without the protection of the bureau, and might have been utterly destroyed.

#### RAIN FORECASTS.

Weekly Citograph, Redlands, Cal., October 15, 1898:

Warnings sent out by the Weather Bureau to the raisin and prune growers in the last two or three weeks gave ample time to stack and save their fruit. The saving to the growers is tremendous, much more than enough to pay the cost of the service for many months. When the farmer feels like kicking because some particular prediction does not happen to fit his particular ten-acre patch, just let him add his voice to the general clamor for more stations, because the more stations the more accurate the predictions can be made.

The warnings during the greater part of this month were issued by Mr. G. H. Willson, the writer being away on leave of absence.—*W. H. Hammon, Forecast Official.*

#### PORTLAND, OREG., FORECAST DISTRICT.

Signals were ordered up on October 12th, 13th, 16th, and 25th, and frost warnings were issued on the 3d, 15th, and